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THE GEOSPACE COMPETENCES WITH THE TPACK MODEL AND OUTDOOR EDUCATIONAUTOR

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Abstract

The acquisition of geospatial competences is a priority in the initial training of teachers. This learning must be achieved through two complementary pillars: technological tools, properly implemented, and the experiential referent of Outdoors Education. The main objective of this study was to evaluate the achievement of spatial and digital competences through an intervention in the classroom of Primary School Teachers of the University of Alicante, with the TPACK teaching model. For this, a mixed methodology has been used, based on the experience of the participants and the answers obtained in the Likert scale questionnaires. The results show significant conclusions about the positive value of the intervention for the achievement of such competences (geospatial and digital) as well as the convenience of implementing similar strategies in the training of future teachers.

Keywords: *Geodatabase, Metadata, Surface water, Soil and Groundwater pollution, Arsenic, Ogosta*

1. INTRODUCTION

The need to readjust the university system to the demands of the Bologna Declaration (Salaburu, Ginés & Haug, 2011) and to the new realities of the 21st century, has led to a modification in the curricula of the Faculties of Education. In this sense, the European Hight Education Area (EHEA) reflects the importance of developing training in skills, understood as tools for access to knowledge and training throughout life (Delors, 1996). Such orientations of the formative design place competencies as true protagonists of T-L processes (Goñi, 2005; European Commission, 2017; Silva, Usart & Lazaro-Cantabrana, 2019).

There is no single, unique definition of competencies. Thus, Organic Law 5/2002, of June 19, on qualifications and professional training describes them as "The set of knowledge and skills that allow the exercise of professional activity according to the demands of production and employment". For his part, Guy Le Boterf (Le Boterf, 2001, p. 23) considers them as "a construction, based on a combination of resources (knowledge, know-how, qualities or skills, and environmental resources (relationships, documents, information and others) that are mobilized to achieve performance". According to the OECD (OECD, 2001; 2018) it is about the intellectual abilities, attitudes and other non-cognitive elements that are acquired and developed by the subjects, necessary to participate effectively in different social contexts. All these approaches give the competences a fundamental role in the integral formation of the students (Feito, 2008; Gomez, 2015; Silva, Usart & Lazaro-Cantabrana, 2019).

They also become the central element to achieve the adaptation of the different training models to a European framework in which those basic skills that students must acquire to achieve lifelong learning are registered. In this sense, the Spanish education system, in its Order ECD / 65/2015, of January 21, specifies in seven the key competences: Linguistic

communication (CCL); Mathematics and basic competences in science and technology (CMCT); Digital (CD); Learn to learn (CPAA); Sense of initiative and entrepreneurial spirit (SIE); Cultural awareness and expressions (CEC); Social and civic (CSC). Hence, the current initial teacher training takes into account, in addition to the acquisition of contents, the development of key competences, paying special attention to digital competence due to the increasing incursion of technologies in all areas of life and, especially, in the educational field. In recent years, the proliferation of educational tools and resources on the Internet has been observed, which requires a methodological and educational adaptation of Primary School studies. These transformations go through a change in the role of the teacher that entails a modification in their training regarding technologies.

Traditionally, the digital qualification of teachers was limited to a manipulative use of ICT. Currently, teaching professionals are required to know how to use these tools properly. The management of technological resources is no longer enough, but pedagogical knowledge of technology is also required so that a correct inclusion of ICTs in educational processes is produced in order to achieve effective and quality learning (Roig, et al., 2015; Ortega & Gomez, 2017).

Aware of such needs, universities around the world have been involved in the development of studies that analyze the skills and abilities of ICT educators. Thus, UNESCO (UNESCO, 2011; 2017) and the OCDE (2016; 2018), in order to help develop education policies and curricula, establishes the skills that teachers must develop to use technologies in their daily work without forgetting the pedagogical guidelines in their use. This document establishes the standards in digital competence of teachers from three approaches that are: technological literacy; the deepening of knowledge and the construction of knowledge.

Therefore, new models of T-L are required to adapt to such requirements in the training of future teachers. The current methodological proposals focus only on some of these aspects, neglecting their integration and, consequently, giving rise to incomplete learning that precludes the correct technological inclusion in the classrooms.

2. THE TPACK TEACHING AND LEARNING MODEL

In light of these needs, new T-L models have emerged that focus their interest in solving the shortcomings raised in existing methodologies. Such is the case of the proposal made by researchers Punja Mishra and Matthew Koehler (Mishra & Koehler, 2006) in the so-called TPACK (Technological Pedagogical Content Knowledge). This model indicates that teachers must have pedagogical knowledge and the subject they teach as well as technological knowledge. These researchers raise the importance of these three elements interacting at the same time in the T-L process. Thus, a network of interrelations is built, that every teacher should know and use for a correct integration of ICT in their daily activity.

Traditionally, teacher training was focused almost exclusively, on the knowledge of the contents (Shulman, 1986). Over time, this training will also include pedagogical knowledge for the development of teaching practice but as two isolated elements, this is, on the one hand the contents of the subject and, on the other hand, the pedagogical contents. Given this situation, and because of the proliferation of studies focused on the disciplinary content of the teacher or on the pedagogy of the teaching process, it obliges to a teacher training in disciplinary and pedagogical contents worked simultaneously. In this research environment, Mishra and Koehler propose a new T-L TPACK model that integrates the technological content to the knowledge content and the pedagogical content with the underlying idea that it cannot be acquired without its contextualization (Koehler & Mishra, 2009).

The TPACK model takes into account the fact that technology is here to stay. Faced with this reality, the teacher must be trained in the use of technologies and skills to adapt to the

changes that occur in the face of new softwares and hardwares. For these authors, the maximum expression of deep teaching knowledge is that which integrates the three knowledge: disciplinary or content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK). This integration occurs in the TPACK model.

The TPACK model provides a novel point of view regarding the incorporation of ICTs in the classroom, focusing attention not only on training in instrumental skills but on their interrelation with the didactic component. In this sense, the competences that the teacher must possess are cognitive, methodological and attitudinal; their mastery and understanding will allow a correct use of technologies in teaching (Ruiz & Gomez, 2017; Cabero & Ruiz-Palmero 2018; Gomez, 2018). Likewise, this model will be able to resolve conflicts in the initial formation of the teaching staff, helping the development of changes in procedures related to the technologies. In this sense, he proposes a reflexive action when it comes to address educational work, helping him to meditate on teacher training because he participates in self-knowledge and self-development in didactic practice (Korthangen & Vasaos, 2005; Ortega & Gomez-Trigueros, 2017; Gomez, 2018). Now, the interest is focused on the process of T-L with technologies and not on how to introduce ICT in the teaching of specific disciplinary contents.

3. OUTDOOR EDUCATION AND GEOGRAPHICAL COMPETENCES

There is the misconception that Outdoor Education is not a discipline in itself, nor is it listed in official curricula. It is considered, rather, as a tool that helps reinforce learning in areas such as sciences. Outdoor Education, defined as one that "uses the landscape as a means to approach and understand the world," [...]", (Freire, 2011, p. 13) arises together with Environmental Education and it materializes in response to the growing concern for the environment, developed in the sixties and with reference to the three domains of learning: knowledge, procedures and attitudes.

From a geospatial dimension, it is a line of research developed in countries such as the United States, Canada, Australia and New Zealand mainly. In the European and Spanish context, there are diverse pedagogical schools that have highlighted the importance of direct contact with the medium for the training of students. Authors such as Jean-Jacques Rousseau, already in the 18th century, defended the importance of the approach of outdoor education, giving to the nature the title of an educational medium (Fröebel, 1918) as well as an experienced framework for each lesson (Decroly & Boon, 1965).

These are, therefore, didactic interventions that advocate the close and necessary link between the spatial environment and the teaching process to achieve complete and meaningful learning. These proposals praise the use of the natural environment and experiential learning, as methods in education (Delgado & Subires, 2016, p. 511; Gomez, 2016) attributing, to the landscape, a functionality as an environment in which the student is related and from which he acquires and develops various capacities such as interpreting and analyze the processes and phenomena of the environment he inhabits.

In this sense, it is affirmed that education disconnected from the nature and from the near landscape of the students alters the perceptions and limits the feeling of belonging with respect to the territorial spaces of the student (Freire, 2011; Gomez, 2016). Forgetting the natural environment in the T-L processes entails a distortion of the reality that, in turn, produces a deformation of the geographical concepts in the mind of the student.

In reference to the importance of learnings in the nature, Fullonet (Fullonet, 1989) highlights its socializing effect; recreational; motivating and stimulating by awakening the respect for the awareness of protecting and preserving local landscapes.

But Outdoor Teaching is, above all, experiential and practical in which different learning processes and strategies have a place, where different objectives converge. It also helps to the

acquisition of the specific competences of the geographic subject. These skills can be arranged around the following nuclei (A.A.V.V., 2004, p. 180-181): a) Understanding and explaining the changes and processes that have occurred in space as a dynamic element, of contrasts and as the result of the interaction of different processes (social, economic, historical, cultural, etc.), understood as management of geographic information; b) Registration and use of cartographic data from an interpretive dimension through the use, reading and interpretation of the maps; c) Analysis of the management and organization of the territory from different dimensions and reflection on socioeconomic differences; d) Field work and direct knowledge of the space for an active participation in the territory in which they live.

This learning strategy allows the acquisition and practical development of geography techniques and skills through different activities such as the location of places and phenomena in a specific place; differentiation of elements and their relationships; interpretation and analysis of its distribution as well as its reasoned explanation (Delgado Peña & Rodrigo Comino, 2012).

In this environment, the new devices are presented as complementary resources for the consolidation and acquisition of geographical competences. Likewise, Geographical Information Technologies (GIT) oriented to the T-L of geography are nourished by Geographic Information Systems and Global Positioning Systems (GPS) (Baker, et al., 2015; Gomez, 2015) and are a necessary teaching tool in today's 21st century society. In a multitude of studies and researchs, it has been found that teaching with these technologies presents a series of advantages that combined with Outdoor Teaching allow to overcome the deficiencies present in the classroom work. Among these advantages are: its ability to motivate, the possibility of personalizing the learning, the promotion of interaction and therefore active teaching, the realization of simulations and learning experiences that were limited in the reality, and the speed in the learning that allowed the use of computer science (Moreno, 1989).

4. CENTRAL ASPECTS OF THE INQUIRY

4.1 Research objectives

The purpose of this research is to analyze the training value acquired by the combination of Outdoor Education and the use of GITs to achieve geospatial skills.

Likewise, the acquisition of disciplinary (CK), pedagogical (PK), technological (TK) knowledge and its correct combination in the initial teacher training for an adequate inclusion of technologies in the teaching and learning processes is studied. To do this, the results obtained in two questionnaires implemented throughout the classroom intervention are compared; the digital competence of the participating students is examined and the influence that the TPACK model may have on the training of future teachers is detailed.

4.2 Methodology and approach of the proposal

The experience carried out has been developed in the context of the Faculty of Education of Alicante and has been carried out along two academic courses (2015-2016 and 2016-2017), in the area of *Didactics of Geography* of the Primary Education Teacher Degree.

The research approach is exploratory and descriptive. A mixed model has been followed for its development (Sevillano, et al., 2007): qualitative, in terms of the practical development of the intervention, and quantitative, based on the results obtained in the questionnaires applied to the participants.

The methodology implemented in the intervention has been active, experiential and dynamic, based on the combination of Outdoor Education with an in group work in the

classroom, based on the T-L TPACK model for the correct implementation of GIT technologies in the Training of the Teachers. The purpose of such a process has been the acquisition of disciplinary knowledge as well as the achievement of Geography's own skills such as: observation; the collection and interpretation of the spatial phenomena and the processes associated with them, promoting significant and collaborative learnings.

As a GIT tool, the Google Earth™ program has been used as well as with other geolocation programs through the use of mobile GPS devices (mobile or tablets) such as GPX Viewer or Maps.me.

In the didactic proposal, students acquire disciplinary knowledge of the subject (CK); digital knowledge applied to geographic contents (TCK) and develop active, cooperative and GIT methodological and pedagogical knowledge linked to outdoor activities (TPK). To achieve this, they must actively participate in the proposed experience outside the classroom, throughout three sessions, one in which teachers and students interacted together and the other two carried out by the groups of participants autonomously, out of the academic hours and this period computed as hours of practice at home.

4.3 Research context and participant sample

As indicated above, the scope of the intervention has been the Faculty of Education of Alicante, in the area of Social Sciences and in the compulsory subject "Didactics of Social Sciences: Geography". This subject is taught in the 2nd year of the current curriculum of said university to obtain the Primary Teacher Degree. It is a compulsory, four-month, six-credit subject whose learning plan is composed of: theoretical classes in which the conceptual, procedural and attitudinal knowledge of the geographic discipline is developed; practices with computer, executed in the classroom and practices with problems that may include, as contained in the subject's own program (http://cv1.cpd.ua.es/ConsPlanesEstudio/cvFichaAsiEEES.asp?wCodEst=C254&wcodasi=17523&wLengua=C&scaca=2016-17#), activities that are developed both within the University Campus itself (30 hours), and outside (45 hours).

The study sample consists of 195 students participating in the intervention, in two different academic courses (2015-2016 and 2016-2017). The sociodemographic distribution of the sample shows a higher percentage of women (80.2%) than men (19.8%), in both courses, as shown in table 1.

Table 1. Percentage distribution, by gender of the participating sample

Academic course	Women		Men		Total
	%	N	%	N	
2015-2016	78,1	75	21,9	22	97
2016-2017	81,5	79	18,5	19	98
Total	80,2	154	19,8	41	195

Such results are significant in the disparity in relation to the gender of students in careers related to teaching, with an important presence of women versus men, and which is reproduced in other Spanish universities (Cozar, et al., 2015; Ortega & Gomez, 2018). It has also been taken into account whether the students studied this course for the first time (first-call) or not. In this sense, there is a significant percentage of first-call students, 96.5% compared to 3.5% of second and third calls. There are no significant data on gender and the call they are taking, because the distribution is equitable and proportional between men and women. Nor is it noteworthy in relation to the two academic courses analyzed (Table 2).

Table 2. Call in which the subject is taken

Academic course	Women		Men		Total
	1st call	other calls	1st call	other calls	
2015-2016	74	1	19	3	97
2016-2017	77	2	17	2	98
Total	151	3	36	5	195

4.4 Statement of the intervention

Being an exploratory work, contextualized within the framework of a compulsory subject of two weekly sessions, of two hours each, the didactic experience has been structured in two phases: a first phase of theoretical classroom sessions, in which they have been presented and developed the conceptual, procedural and pedagogical contents of the geographical subject from a didactic dimension; and a second phase where practices have been proposed through the Outdoor Education strategy and in which GITs have been used.

Throughout the educational process, it has been tried to implement a dynamic training intervention where students will actively participate, favoring the learning of the geography's own competences as well as promoting the acquisition of knowledge necessary for the correct development of their future professional life. In this sense, a timetable has been designed (table 3) in which practical activities, their chronology and the knowledge acquired by students are specified.

Table 3. Schedule of the learning experience

Chronology	Homework and place of development	Materials	Knowledge to acquire
First week of course (September)	Presentation of the subject in the classroom. Proposal of the organization of the subject. The first is distributed and completed online questionnaire. Reference *classroom*	Dossier of topics in Virtual campus.	Understanding of the structure and organization of the subject.
September, October and first fortnight of November	Development of conceptual content; key competencies; strategies and subject matter competencies through of the exhibition of teachers. Class of Reference with computers.	Dossier of themes of Virtual Campus and PC.	CK; PK; CT; PCK
Second fortnight of November	Presentation of the TIG tools. Use manipulative and didactic application for T-L of matter through the exposure of the teachers. Reference room with computers	Access to resources in Internet and manuals reference on the GIT.	TCK; TPK
First fortnight of December	Creation of teaching proposals with GIT for the Primary classroom where develop the contents and geospatial skills. Work student group cooperative. Class of Reference with computers.	PC's, mobile and student tablets and other materials (atlas, textbooks, notes, interviews to other teachers).	PCK; TCK; TPK: TPACK
Second fortnight of December	Implementation of educational courses with GIT, outdoors. It is distributed and complete the second online questionnaire. Campus of the University of Alicante.	Mobile phones and tablets.	TPACK

4.5 Analysis instruments

As it is a mixed exploratory study, two questionnaires composed of closed-answer questions or Likert scale of five categories have been used, ranging from "Strongly disagree" to "Strongly agree" and that have been used to perform a quantitative analysis of the intervention. In addition, open-ended questions have been developed that have served to carry out a qualitative assessment of the didactic proposal developed. Specifically, in the second questionnaire, in addition to the questions on the acquisition of knowledge, questions related to the perception of the participating students about the methodology of the subject and Outdoor Learning have been raised.

The structure of the questionnaires is divided into sections. In the initial questionnaire or first questionnaire, which consists of twelve items, the following parts are distinguished: a first block of sociodemographic questions and a second set of questions about the geospatial and digital competences of the participants. In the final questionnaire or second questionnaire, consisting of fifteen items, a third group of questions related to the assessment of outdoor activity with GIT implemented is added to the sections of the first questionnaire.

For the design of the questionnaires, other instruments developed in research in which ICTs have been included as work tolos, have been taken into account (Mouza, Karchmer-Klein, et al., 2014; Roig & Flores, 2014; Cabero, Marin & Castaño, 2015; Ortega & Gomez, 2019). Subsequently, they have been validated by university experts from the departments of Sociology, Geography and General and Specific Didactics from the University of Alicante.

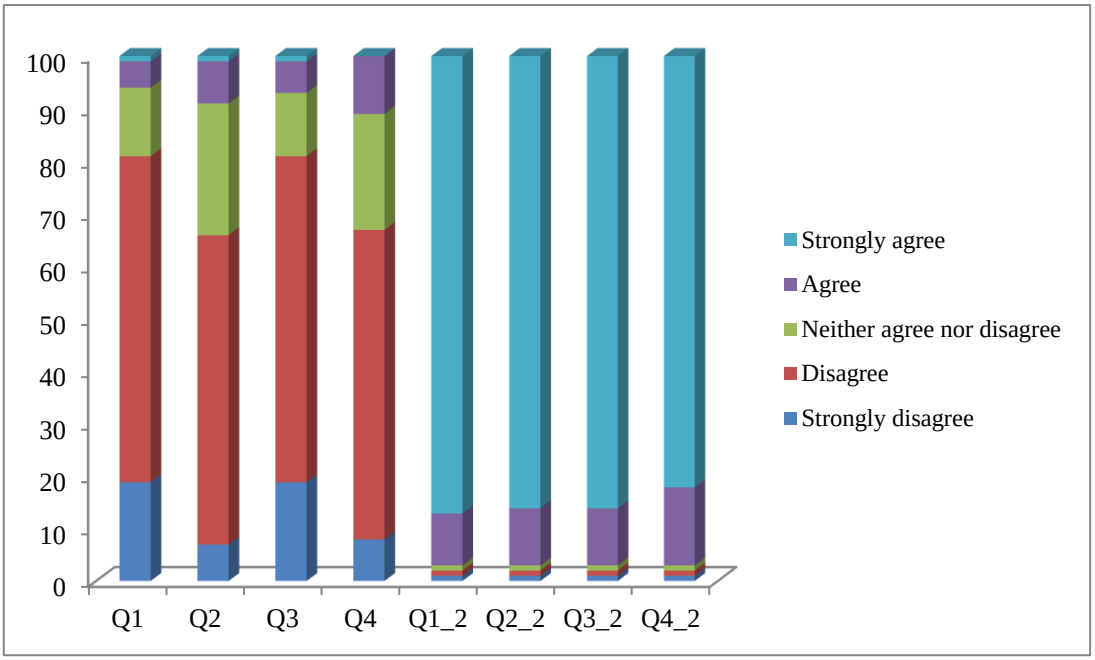
In relation to its internal consistency, and with the intention of being able to draw valid and conclusive conclusions, the statistical program SPSS (version 23) has been used that has yielded a Cronbach's alpha coefficient of reliability value of $\alpha = 0.899$ for the questionnaire initial and $\alpha = 0.931$ for the final, significant of the high value of the results obtained with both (Bisquerra, et al., 2004). Another illustrative index of the validity of the items and the structure of the instruments used has been Pearson's Chi-Square with results of p- value <1 = Sig. 0.001(Cohen, Manion & Morrison, 2002) for the two questionnaires, indicative of the high correlation of the questions posed. Such indexes allow us to affirm the validity of the tools created as an analysis tool.

5. CENTRAL ASPECTS OF THE INQUIRY

As already has been indicated, the answers obtained in the questionnaires distributed before and after the experience have been analyzed. The purpose has been to know the degree of acquisition of the geospatial and digital competences of the participating sample, their opinion regarding the different activities carried out and their assessment of the usefulness of what they have learned for their academic training and as future teachers.

It should be noted that this is a student trained in new technological advances (computers, videos and video games, digital music, telephony and other similar tools). This characteristic is present in the data obtained regarding the positive acceptance of such digital devices for the acquisition of knowledge and competencies of Geography.

If the data obtained from the first questionnaire are compared with those of the second one, from both academic courses, in relation to their knowledge of geospatial competences, a positive evolution towards their understanding is observed. Thus, at item 1, 18.4% of the participants choose the answer "Strongly disagree" and 63% "Disagree" indicative of the lack of knowledge of said competencies. The same goes for item 2; Item 3 and Item 4 that show a percentage greater than 60% of "Disagree" answers in the first questionnaire. Similarly, there is a change in the values of the second questionnaire with more than 85% of answers "Totally agree" to such questions (figure 1).



Q1: I have the necessary geospatial skills to develop my work as a teacher in the Social Science classroom.
Q2: I am able to orient myself with the coordinate system of the cardinal points, using a digital compass (GPS device or mobile or.
Q3: I can and I know to interpret a digital map (GPS device or mobile or tablet app) with the geographic coordinate system (latitude and longitude).
Q4: I know to read the map scale (digital and non-digital), to orient me by the cardinal points system and to interpret its content. tablet app).

Figure 1. Knowledge in geospatial skills initial and final questionnaire.

With respect to the analysis of the digital competences of the sample, in Table 4, the positive assessment regarding the manipulative knowledge of the GITs can be seen, in the first and second phase of the questionnaire. When asked about the ability to interrelate GITs and pedagogies, the low and no digital competence and TPK of students in the first phase of the study is confirmed. These results vary towards an increase in "Agree" and "Totally agree" responses after the intervention.

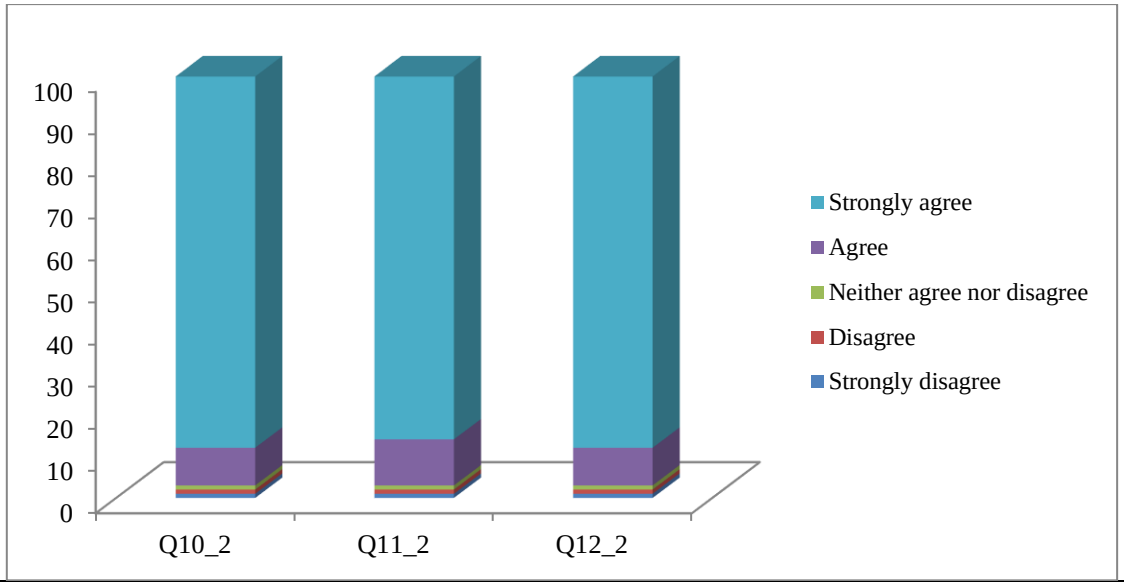
The highest average values are collected throughout the second phase, in the two academic courses analyzed. These results refer to the positive response (value between 4.56 and 4.93) regarding the progressive training of the participating sample in such technological resources, both manipulative and for the creation and proposal of activities, for the Primary classroom. In the same way, the standard deviation (σ) shows dispersion values admitted for the number of students that make up the sample (Spiegel, Srinivasan & Schiller, 2001). The reason for the favorable evolution in relation to their training for the implementation of the GITs in an appropriate manner and their positive perception on these technologies for the creation of contents, it can be due to the effectiveness of the intervention carried out and their own work with these tools.

In relation to the methodology implemented in the subject, a very positive evaluation is observed with the total answers "Agree" or "Totally agree" for questions10, 11 and 12 of the second questionnaire. Likewise, there is a very positive perception about the organization of the proposal made for the acquisition of conceptual and pedagogical geospatial knowledge, as indicated by the results shown in Figure 2.

Table 4. Responses on digital competence initial and final questionnaire

Question	2015-2016				2016-2017			
	First phase				Second phase			
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
Q5	2.56	0.467	4.81	0.455	2.64	0.467	4.56	0.280
Q6	2.12	0.463	4.78	0.432	2.69	0.428	4.93	0.377
Q7	2.21	0.430	4.67	0.397	2.79	0.472	4.83	0.391
Q8	2.59	0.483	4.88	0.423	2.90	0.245	4.75	0.446
Q9	2.51	0.434	4.68	0.419	2.63	0.488	4.73	0.439

Q 5: I have a technological background that allows me to design materials and activities with GIT for the Social Sciences classroom.
Q6: My knowledge of the various GIT technologies is adequate to implement their use in the Primary classroom.
Q7: The design of tasks with GIT allows the creation of innovative strategies and the creation of more attractive and innovative content for students.
Q8: I am able to design didactic proposals in which active methodologies are interrelated with GIT for the Primary classroom.
Q9: The design of tasks with GIT allows me to achieve theoretical and pedagogical knowledge of the geographic subject.



Q10: Outdoor Learning with GIT has allowed me to acquire, in a more complete way, geospatial and digital skills.
Q11: The creation of Outdoor routes with GIT has contributed to increase my pedagogical knowledge and make a more adequate inclusion of technologies.
Q12: Working with GIT and with Outdoor Learning has helped me to recognize the value of geospatial skills in my training as a teacher.

Figure 2. Evaluation of the final questionnaire intervention for both courses.

Regarding the qualitative analysis of the study, the data obtained in the open-ended questions of both questionnaires have been examined. For a more thorough assessment and with the intent to carry out a comparison of the results of both questionnaires, response categories have been established. Thus, in the question "*Cite geospatial competences necessary for your work as a teacher*" three categories of responses have been constituted: a) those that include the concept of *location* and that refer to the position of the components of the geographical space on the earth's surface , which cite basic reference systems: the cardinal points and geographical coordinates; b) those that mention the *distribution and organization* aspect of the components

of the geographical space and c) those that speak of the *relationship and connection* between two or more components of the geographical space. In this sense, 78% of the sample does not cite any of these three categories in the first questionnaire and in both academic courses 19% of the students leave the answer blank and only 3% include any of these three concepts, mainly *location*. If these results are compared with those obtained in the second or final questionnaire, there is an increase in the responses that include two or more geospatial competences (97%) as shown in Figure 3.

Another open question has been the following: "*How does Geography help us understand space?*" In the same way as with the previous question, three categories of response have been formed: a) those related to the proper *management of information in virtual maps and map plans for our orientation in the space and interpretation of the content they contain*; b) those that include the concept of the *relation of the components and elements of the geographical space and in which the socio-economic spatial differences have a place* and c) those that mention *the participation in the closest space* from a dimension of respect, protection and care of the environment as well as cooperation to propose solutions to local problems. The results are significant and show, in the first questionnaire, a high percentage of blank answers (37%) as well as incorrect answers (63%) in both academic courses. There is a positive variation with 98% of responses, in the second questionnaire, which mention to two or more categories (Figure 3).

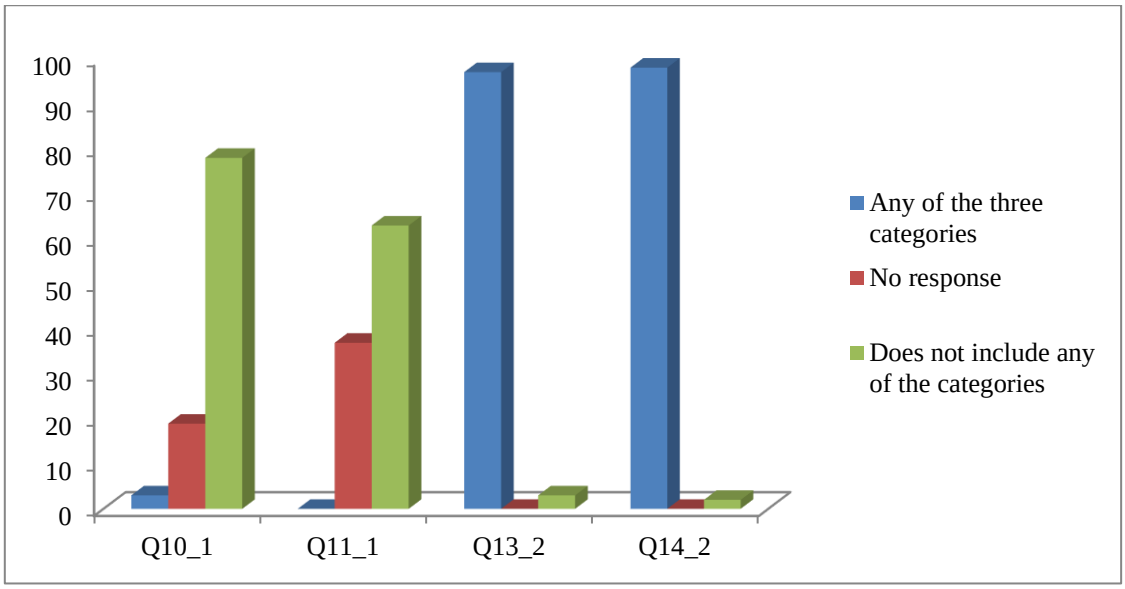


Figure 3. Open response questions: space skills both courses.

6. CONCLUSIONS

Based on the results obtained, and as already found in similar research, (Roblizo & Cozar, 2015; Roig, et al., 2015; Ortega & Gomez, 2018) there is insufficient digital competence among future teachers that is usually limited to the manipulative use of technologies, relegating the pedagogical use of ICTs to a secondary level.

This characteristic, latent in most of the Master's degree curricula, highlights the dubious inclusion of these technological tools in the Primary Education classrooms. In this sense, a modification in the T-L models of future teachers is necessary in relation to the incorporation of these resources in classrooms, in an appropriate manner.

After the didactic intervention developed with 195 students of the 2nd year of Master's Degree, in which the GIT (geolocation software such as Google EarthTM, GPX Viewer or

Maps.me, on devices such as smartphones or tablets) have been combined with the Outdoor Education through the development of geographical routes, the results, already analyzed, indicate the enormous possibilities offered by this type of didactic proposals for the initial training of teachers, facilitating the development of geographical competencies such as: orientation, interpretation of the designed cartography and the observation of the closest space. At the same time, its potential for the acquisition of digital skills (TCK and TPK) is confirmed by promoting the use of different geolocation software installed on technological devices, and promoting significant and experiential learning about the closest space.

It should also be said that the participating students consider that the use of the GITs for the elaboration of materials favors the T-L processes for the development of geographic knowledge and competences (CK), helping to improve student performance, as already stated in similar studies, as they are motivating and attractive proposals for the Primary classroom. There is also a very positive perception towards the implementation of outdoor activities by recognizing its potential for the understanding of the society, the nearby space and the geographical landscape (PCK) closest to the student.

Likewise, the high consideration of this type of outdoor strategies in combination with the new technologies is verified.

In short, it can be concluded that this type of experience, with innovative proposals based on the T-L TPACK model, achieves the attainment of knowledge about the Content of the Matter (CK) and the Pedagogical Knowledge of the Content (PCK) at the same time as they allow the acquisition of Knowledge of the use of Technologies (TCK) and Technological Pedagogical Knowledge (TPK) among future teachers. In this way, an interesting contribution is produced by enabling the training of competent teachers in both geospatial content and active methodologies and with GIT, demonstrating the value of this type of T-L models that leave behind traditional passive methodologies and that they adapt to the new requirements of future educators of the current Information and Communication Society of the 21st century.

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